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Memo

To: Minnesota Climate Change Advisory Group

From: The Center for Climate Strategies

CC: Minnesota Department of Commerce
Minnesota Pollution Control Agency
Minnesota Technical Work Group Members

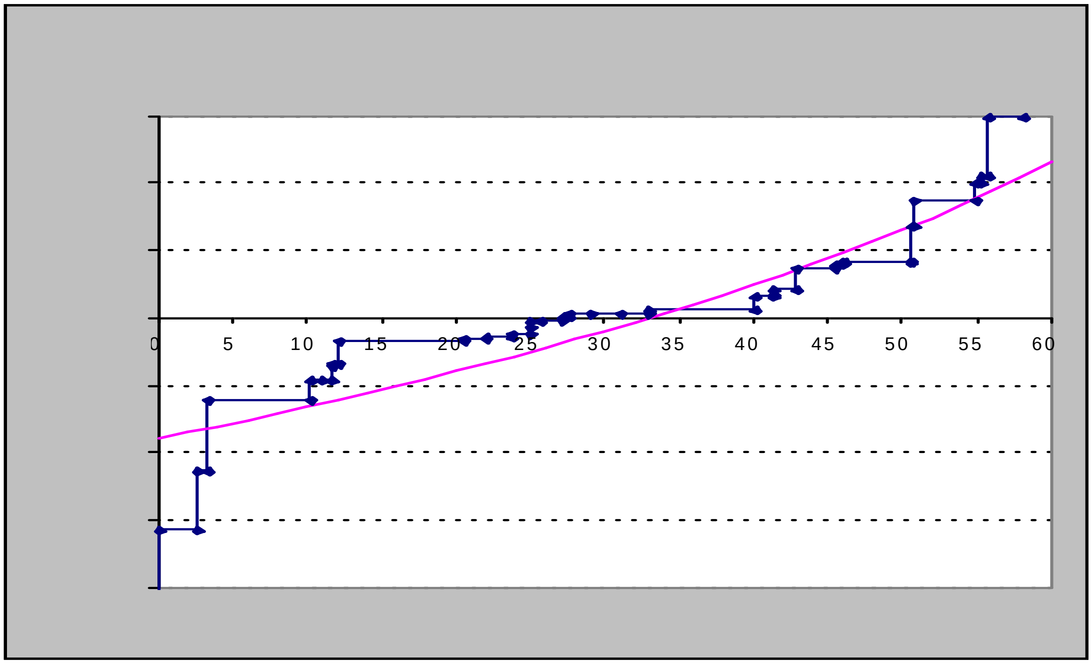
Subject: Preparation for the Seventh Meeting of the Minnesota Climate Change Advisory Group Meeting

Date: January 10, 2008

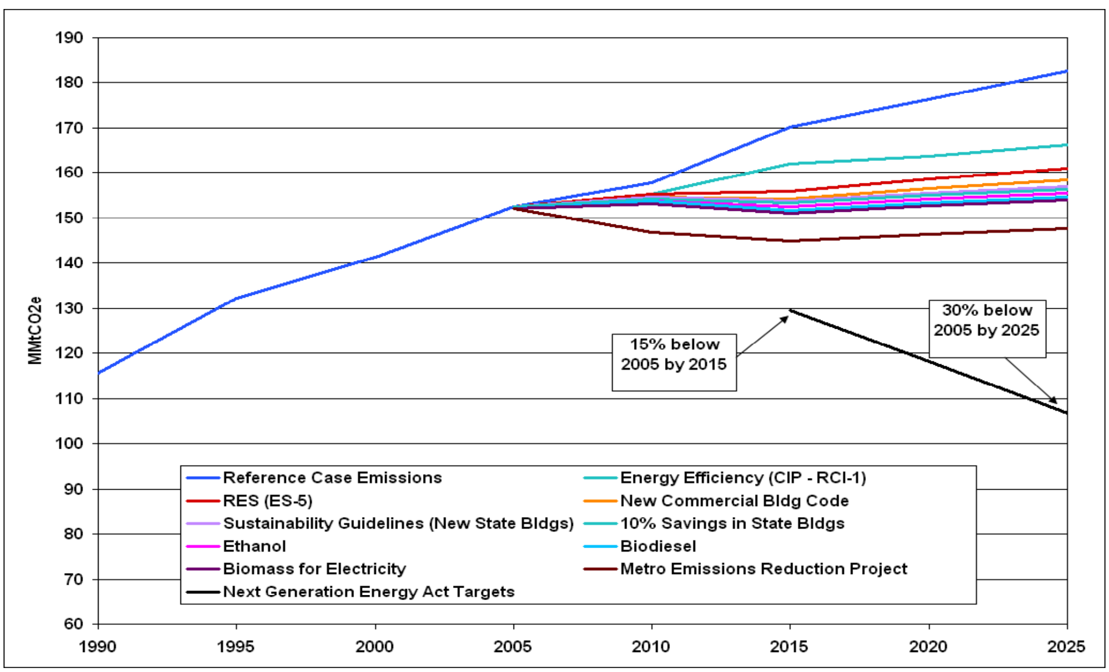
At the seventh meeting of the Minnesota Climate Change Advisory Group (MCCAG) on Thursday, January 10, 2008 the MCCAG will continue its review and final approval of draft pending policy options, with the goal of approving as many as possible in order to finish work by January 24, 2008. We also will review and approve final updates to the statewide inventory and forecast of emissions. Based on decisions made by the MCCAG, the Technical Work Groups (TWGs) will continue to update quantification and development of the remaining draft policy options that the MCCAG does not approve during this seventh meeting, as needed. Additional consideration and approval of the remaining draft options will continue at the final MCCAG meeting on January 24, 2008.

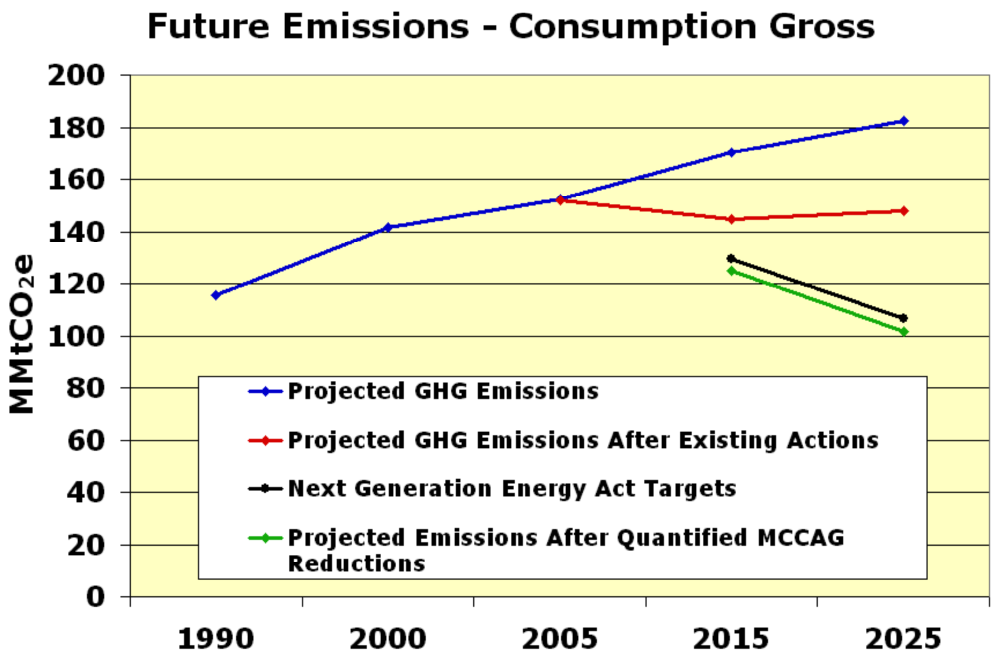
As preparation for our seventh meeting, please review the draft policy options below and other background documents posted to the project website at: www.mnclimatechange.us. Please note and review the summary of results below, as well as updates to the detailed policy options templates posted to the project website.

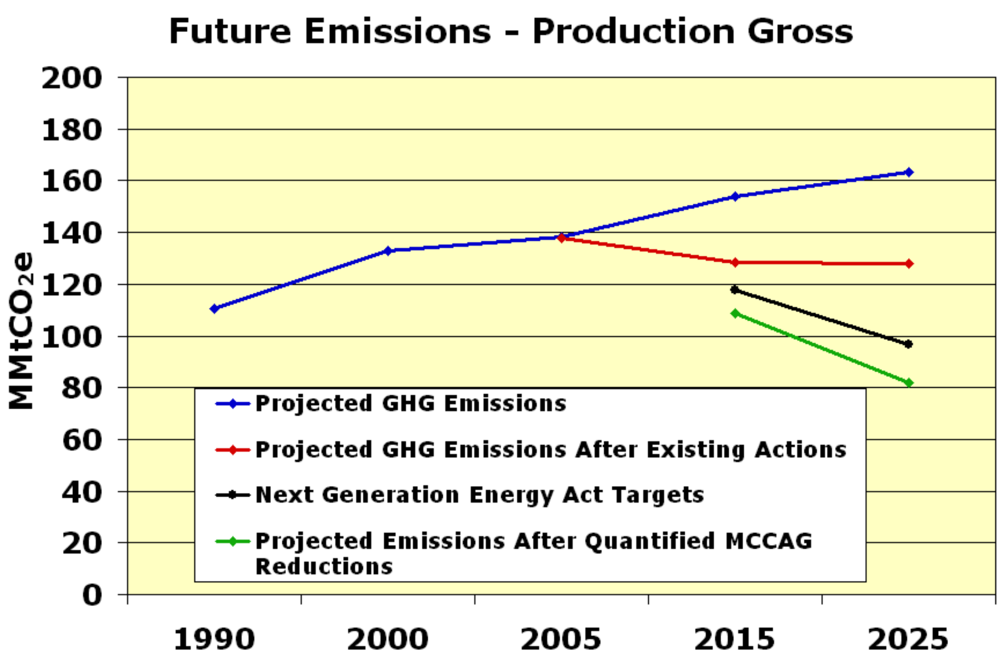
Draft MN GHG Supply Curve (Completed & Pending Options)



MN GHG Reductions – Existing Actions




Future Emissions - Consumption Gross
MMtCO2e
200
180
160
140
120
100
80
60
40
20
0
1990
2000
2005
2015
2025
Projected GHG Emissions
Projected GHG Emissions After Existing Actions
Next Generation Energy Act Targets
Projected Emissions After Quantified MCCAG Reductions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Draft MCCAG Results

Consumption Basis - Gross / Net Emissions					
	1990	2000	2005	2015	2025
Projected GHG Emissions	115.7	141.4	152.4	170.2	182.7
Reductions from Existing Actions	0.0	0.4	0.4	25.4	35.0
Projected GHG Emissions After Existing Actions			152.0	144.8	147.7
Next Generation Energy Act Targets (NGEA)				129.6	106.7
Total GHG Reductions from MCCAG				19.8	46.2
Difference Between MCCAG Reductions & NGEA Targets				-4.6	-5.3
Projected Emissions After Quantified MCCAG Reductions				125.0	101.4

Production Basis Gross / Net Emissions					
	1990	2000	2005	2015	2025
Projected GHG Emissions	110.7	133.0	138.2	153.9	163.2
Reductions from Existing Actions	0.0	0.4	0.4	25.4	35.0
Projected GHG Emissions After Existing Actions			137.8	128.5	128.2
Next Generation Energy Act Targets (NGEA)				117.5	96.8
Total GHG Reductions from MCCAG				19.8	46.2
Difference Between MCCAG Reductions & NGEA Targets				-8.8	-14.8
Projected Emissions After Quantified MCCAG Reductions				108.7	81.9

Table 1.
Residential, Commercial, and Industrial
Summary List of Draft Pending Policy Options

Option No.	GHG Reduction Policy Option Name	GHG Reductions ($MMtCO_2e$)			Net Present Value (Million $)	Cost-Effective-ness ($/t$CO_2$e)	Level of Support
		2015	2025	Total (2008–2025)			
RCI-1	Maximize Savings From the Utility Conservation Improvement Program (CIP)	5.64	13.10	122.6	-$5,824	-$48	Complete
RCI-2	Improved Uniform Statewide Building Codes	0.004	0.005	0.1	-$31	-$402	Complete
RCI-3	Green Building Guidelines and Standards Based on Architecture 2030	0.62	0.94	11.1	-$296	-$27	Complete
RCI-4	Incentives & Resources to Promote Combined Heat and Power (CHP)	0.96	4.95	33.1	$1,009	$30	Pending
RCI-5	Program To Reduce Emissions of Non-Fuel, High-Global-Warming-Potential GHGs	0.02	0.05	0.5	-$2	-$5	Complete
RCI-6	Non-Utility Strategies and Incentives To Encourage Energy Efficiency and Reduce GHG Emissions	0.25	1.30	8.3	-$307	-$37	Pending
RCI-7	Conservation Improvement-Type Program for Propane and Fuel Oil Efficiency	0.05	0.05	0.7	-$21	-$28	Pending
RCI-8	Energy Performance Disclosure	*Not quantified*					Complete
RCI-9	Promote Technology-Specific Applications to Reduce GHG Emissions	*Not quantified*					Complete
RCI-10	Support Strong Federal Appliance Standards and Require High State Standards in the Absence of Federal Standards	0.8	1.4	15.3	-$1,390	-$91	Pending
	Sector Total After Adjusting for Overlaps	**7.9**	**21.1**	**184.1**	**TBD**	**TBD**	
	Reductions From Recent Actions	**3.0**	**5.1**	**16.0**	**TBD**	**TBD**	
	Sector Total Plus Recent Actions	**10.9**	**26.2**	**190.1**	**TBD**	**TBD**	

Note: Negative numbers represent cost savings.

Table 2.
Energy Supply
Summary List of Draft Pending Policy Options

	Policy Option	GHG Reductions ($MMtCO_2e$)			Net Present Value 2008–2025 (Million $)	Cost-Effective-ness ($/tCO_2e$)	Level of Support
		2015	2025	Total (2008–2025)			
ES-1	Generation Performance Standard	4	5	62	–$7,812	–$126	Pending
ES-3	Efficiency Improvements, Repowering and other Upgrades to Existing Plants	2	3	33	$554	$17	Pending
ES-4	Transmission System Upgrading, Including Reducing Transmission Line and Distribution System Loss	0	0	4	–$47	–$13	Pending
ES-5	Renewable and/or Environmental Portfolio Standard	8	16	133	–$1,675	–$13	Pending
ES-6	Nuclear Power Support and Incentives	0	8	48	$3,321	$70	Pending
ES-7	Advanced Fossil Fuel Technology Incentives, Support or Requirements	–2	–2	–22	$3,591	–$162	Pending
ES-8	Carbon Capture and Storage and/or Reuse Policies	1	1	18	$1,536	$84	Pending
ES-10	Voluntary GHG targets	*Not quantified*					Pending
ES-12	Distributed Renewable Energy Incentives and/or Barrier Removal	*Still being quantified*					Pending
ES-13	Technology-Based Approaches, Including Research and Development, Fuel Cells, Energy Storage, Distributed Renewable Energy Technologies, etc.	*Not quantified*					Pending
	Sector Total After Adjusting for Overlaps	**13.3**	**31.1**	**268**	**–$2,070**	**–$7.7**	
	Reductions From Recent Actions	**6.9**	**6.9**	**123**	**TBD**	**TBD**	
	Sector Total Plus Recent Actions	**23.2**	**37.0**	**381**	**TBD**	**TBD**	

Notes:

1. All option totals are relative to the underlying assumption that electric expansion in MN proceeds with the recently legislated Conservation Improvement Program, Renewable Energy Standard and all planned additions including the Mesaba and Big Stone 2 stations.

2. During its September 27, 2007 meeting, the MCCAG agreed to move ES-2 (Improve the GHG Profile of Biofuels and Fossil Fuels [e.g., Low Carbon Fuel Standard, Biofuel Production]) to the TLU TWG which is now being addressed under TLU-3 (Low GHG Fuel Standard).

3. See Annex 3 for details of the calculation of sector total after adjusting for overlaps.

4. Negative numbers represent cost savings.

Table 3. Transportation and Land Use Summary List of Draft Pending Policy Options

	Policy Option	GHG Reductions* ($MMtCO_2e$)			Net Present Value 2008–2025 (Million $)	Cost-Effective-ness ($\$/tCO_2e$)	Level of Support
		2015	2025	Total 2008–2025			
TLU Area 1: Reduce VMT							
	To 1990 Light-Duty aggregate	2.72	8.12	66.4			
	To 1990 Light-Duty per capita	0.75	4.39	44.0			
TLU-1	Improved Land Use Planning and Development Strategies	0.7	2.2	16.1	Net savings	Net savings	Pending
TLU-2	Expand Transit, Bicycle, and Pedestrian Infrastructure	0.1	0.3	3.0	$0	$0	Pending
TLU-5	Climate-Friendly Transportation Pricing / Pay as You Drive	1.2	2.7	25.8	–$1	–$1	Pending
TLU-7	"Fix-it-First" Transportation Investment Policy and Practice	Not quantified					Pending
TLU-9	Workplace Tools to Encourage Carpooling, Bicycling, and Transit Ridership	0.3	0.4	5.3	Large net savings	Large net savings	Pending
TLU-14	Freight Mode Shifts: Intermodal and Rail	TBD					Pending
TLU Area 2: Reduce Carbon per Unit of Fuel							
TLU-3	Low GHG Fuel Standard (Overlap With AFW-7)	3.18	4.4	24.3	$3,090	$119	Pending
TLU Area 3: Reduce Carbon per Mile and/or per Hour							
TLU-4	Infrastructure Management	0.04	0.1	0.9	Not quantified		Pending
TLU-6	Adopt California Clean Car Standards	Being revised in response to new CAFÉ					Pending
TLU-11	Heavy-Duty Idle Reduction	Not quantified				$4 at $2.40/gal –$66 at $3.40/gal	Pending
TLU-12	Mobile Source Emissions Reduction	TBD					Pending
TLU-13	Reduce Maximum Speed Limits	TBD				$50 at $2.40/gal –$19 at $3.40/gal	Pending
	Sector Total After Adjusting for Overlaps	**5.2**	**9.6**	**71.6**	**TBD**	**TBD**	
	Reductions From Recent Actions	**1.6**	**1.8**	**22.6**	**0.0**	**0.0**	
	Sector Total Plus Recent Actions	**3.6**	**7.8**	**49.0**	**TBD**	**TBD**	

Notes:
All GHG reduction numbers will change if the MCCAG approves the use of the new VMT baseline.
Negative numbers represent cost savings.

Table 4.
Agriculture, Forestry, and Waste Management
Summary List of Draft Pending Policy Options

	Policy Option	GHG Reductions ($MMtCO_2e$)			Net Present Value 2008–2025 (Million $)	Cost-Effectiveness ($/t$CO_2$e)	Level of Support
		2015	2025	Total 2008 2025			
AFW-1	Agricultural Crop Management						Complete
	A. No Till	0.72	1.30	15	–$4	–$0.3	
	B. Nutrient Management	0.79	1.35	15	–$543	–$37	
AFW-2	Land Use Management Approaches for Protection and Enrichment of Soil Carbon						Complete
	A. Preserve Land	0.15	0.44	3.7	$120	$33	
	B. Reinvest in Minnesota–Clean Energy (RIM-CE)	0.09	0.19	1.8	$193	$110	
AFW-3	In-State Liquid Biofuels Production						Pending
	A. Ethanol carbon content	2.13	3.00	35	$23	$1	Pending
	B. Fossil diesel displacement	0.03	0.19	1.4	$85	$62	
	C. Gasoline Displacement	4.63	13.60	114	$563	$5	
AFW-4	Expanded Use of Biomass Feedstocks for Electricity, Heat, or Steam Production	1.3	3.8	32	$392	$12	Complete
AFW-5	Forestry Management Programs to Enhance GHG Benefits						Complete
	A. Forestation	0.55	2.19	17	$218	$13	
	B. Urban forestry	1.2	2.7	26	–$295	–$12	
	C. Wildfire reduction	*Not Quantified*					
	D. Restocking	2.1	8.4	65	$2,187	$33	
	E. Forest health and enhanced sequestration	*Not Quantified*					
AFW-6	Forest Protection—Reduced Clearing and Conversion to Non-Forest Cover	2.2	2.7	34	$74	$3	Complete
AFW-7	Integrated Waste Management						Pending
	A. Source Reduction	0	3.7	9.2	TBD	TBD	
	B. Recycling	3.1	4.1	46	TBD	TBD	
	C. Composting	0.23	0.24	4.1	$173	TBD	
AFW-8	End of Use Waste Management Practices						Pending
	A. Landfilled Waste Methane	0.03	0.34	2.1	$2.1	$1	
	B. Organics Recovery & WTE	0.11	0.07	1.8	TBD	TBD	
	C. WTE Preprocessing	0.002	0.005	0.04	*Not Quantified*		
	Sector Total After Adjusting for Overlaps*	**13.3**	**30.7**	**283.6**	**TBD**	**TBD**	
	Reductions From Recent Actions	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	
	Sector Total Plus Recent Actions	**13.3**	**30.7**	**283.6**	**TBD**	**TBD**	

Note: Negative numbers represent cost savings.

Table 5.
Cross-Cutting Issues
Summary List of Draft Pending Policy Options

Option No.	Policy Option	GHG Reductions ($MMtCO_2e$)			Net Present Value 2008–2025 (Million $)	Cost-Effectiveness ($/tCO_2e)	Status of Option
		2015	2025	Total 2008-2025			
CC-1	GHG Inventories, Forecasting, Reporting, and Registry	*Not Quantified*					Pending
CC-2	Statewide GHG Reduction Goals and Targets	*Not Quantified*					Pending
CC-3	State and Local Government GHG Emissions (Lead-by-Example)	*Not Quantified*					Pending
CC-4	Public Education and Outreach	*Not Quantified*					Pending
CC-7	Participate in Regional and Multi-State GHG Reduction Efforts	*Not Quantified*					Pending
CC-8	Encourage the Creation of a Business-Oriented Organization to Share Information and Strategies, Recognize successes, and Support Aggressive GHG Reduction Goals	*Not Quantified*					Pending
CC-9	Dedicate Greater Public Investment to Climate Data and Analysis	*Not Quantified*					Pending
CC-10	Facilitate the Development of an Effective Carbon Credit System for MN	*Not Quantified*					Coordinate w/ Cap and Trade TWG
	Sector Total After Adjusting for Overlaps	*Not Quantified*					
	Reductions From Recent Actions	*Not Quantified*					
	Sector Total Plus Recent Actions	*Not Quantified*					

Note: Negative numbers represent cost savings.

Table 6.
Cap and Trade (C&T)
Summary List of Draft Pending Policy Options

Option No.	Policy Option	GHG Reductions ($MMtCO_2e$)			Net Present Value (Million $)	Cost-Effective-ness* ($/tCO$_2$e) 2025	Permit Price† ($/tCO$_2$e) 2025	Level of Support
		2015	2025	Total (2008–2025)				
C&T-1 Cap and Trade Program	Midwestern Governors Association (MGA) Partners C&T – *High Cost Case* (All Sectors)		77.24			$3.37	$45.68	Pending
	MGA Partners C&T – *Low Cost Case* (All Sectors)		77.19			$1.19	$40.58	Pending
	MGA Partners+Observers C&T – *High Cost Case* (All Sectors)		80.33			$5.08	$49.85	Pending
	MGA Partners+Observers C&T – *Low Cost Case* (All Sectors)		80.15			$3.43	$44.23	Pending
	MGA plus WCI Partners C&T – *High Cost Case* (All Sectors)		72.56			$0.85	$39.60	Pending
	MGA plus WCI Partners C&T – *Low Cost Case* (All Sectors)		74.79			$0.75	$37.71	Pending
	MGA and WCI Partners+Observers C&T – *High Cost Case* (All Sectors)		79.42			$4.58	$48.61	Pending
	MGA and WCI Partners+Observers C&T – *Low Cost Case* (All Sectors)		81.51			$4.13	$45.94	Pending
	MGA Partners C&T – *High Cost Case* (Power Sector)		22.41			$1.64	$32.14	Pending
	MGA Partners C&T – *Low Cost Case* (Power Sector)		22.41			$1.22	$23.93	Pending
	MGA Partners+Observers C&T – *High Cost Case* (Power Sector)		22.99			$2.43	$33.98	Pending
	MGA Partners+Observers C&T – *Low Cost Case* (Power Sector)		22.99			$1.81	$25.30	Pending

Option No.	Policy Option	GHG Reductions ($MMtCO_2e$)			Net Present Value (Million $)	Cost-Effective-ness* ($/t$CO_2$e) 2025	Permit Price[†] ($/t$CO_2$e) 2025	Level of Support
		2015	2025	Total (2008–2025)				
~~C&T-2~~	MN-Only C&T (merged into C&T-1)		80.83			$8.35	$50.10	Pending
~~C&T-3~~	National C&T (merged into C&T-1)							Pending
C&T-4	Carbon Tax							Pending
C&T-5	Market Advisory Group (Formerly CC-11)							Pending
C&T-6	Regional and Multi-State GHG Reduction Efforts (Formerly CC-7)							Pending
C&T-7	Carbon Credit System for Minnesota (Formerly CC-10)							Pending

Note: Negative numbers represent cost savings.

Note: MGA C&T partners include Iowa, Illinois, Kansas, Michigan, Minnesota, Wisconsin, and Manitoba; MGA C&T observers include Indiana, Ohio, and South Dakota; WCI partners include Arizona, California, New Mexico, Oregon, Utah, Washington, British Columbia, and Manitoba; WCI observers include Colorado, Idaho, Montana, Nevada, and Wyoming. In order to run simulations including both MGA and WCI states in year 2025, we used 2020 marginal cost curves for WCI states for the year 2025. The emission cap for both MGA and WCI states (or provinces) is assumed to be 30% below the 2005 level in Year 2025.

* This represents the average cost per tCO_2e mitigated/sequestered for Minnesota.

[†] This represents the marginal cost of the last tCO_2e mitigated/sequestered, and applies to all states involved in a trading arrangement.

Results are subject to change. We have limited data on mitigation/sequestration options for Midwestern States. Preliminary results given here may change when better data is available.

It is anticipated that future model runs will include the following:

- All RGGI states of the Northeast
- Updated MN specific cost curves from the MCCAG process, and new cost curves for other states in the Midwest
- Cost curve modifications to address sensitivity analysis and alternate assumptions
- Other design assumption modifications based on MCCAG feedback